Riley (C. V.)

Compliments of C. V. Riley.

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OBSERVATIONS ON THE FERTILIZATION OF YUCCA AND ON STRUCTURAL AND ANATOMICAL PECULIARITIES IN PRONUBA AND PRODOXUS.

By C. V. RILEY, of Washington, D. C.

[ABSTRACT.]

THIS paper records some recent experiments and observations which establish fully and conclusively the fact that Pronuba is necessary to the fertilization of the capsular Yuccas. It describes for the first time how the pollen is gathered and collected by the female Pronuba. The act is as deliberate and wonderful as that of pollination. Going to the top of a stamen she stretches her tentacles to the utmost on the opposite side of the anther, presses the head down upon the pollen and scrapes it together by a horizontal motion of her maxillæ. The head is then raised and the front legs are used to shape the grains into a pellet, the tentacles coiling and uncoiling meanwhile. She thus goes from one to another until she has a sufficiency.

My observations confirm the accuracy of Dr. Geo. Engelmann's conclusion as to the impotence of the stigmatic apices in some of the Yuccas and show how the apparently contradictory experience of Mr. Meehan can be reconciled on variation in this respect in the species of the same genus. The exceptional self-fertilization in *Yucca aloifolia* — the only species in which it is recorded — is shown to be due to the fact that in the fruit of this species, there is no style, the stigma being sessile and the nectar abundant, filling and even bulging out of the shallow opening or tube. The flowers are always pendulous and the pollen falling from anthers, under favorable circumstances, readily lodges on the nectar.

The irregularity in the shape of the fruit of the Yuccas — considered a characteristic by botanists — is proved by experiments to be due to the punctures of Pronuba.

The egg of Pronuba which averages 1.5 mm. long, having a swollen apical end and a long and variable pedicel is passed into the ovarian cavity. The puncture is made usually just below the middle of the pistil on the deeper depression which marks the true dissepiment, or through the thinnest part of the wall. The horny part of the ovipositor reaches the longitudinal cavity at the external base of the ovule near the funiculus, without, as a rule, penetrating or touching the ovule itself, and the delicate and extensile oviduct then conveys the egg for some distance (the length of six or eight ovules) along the cavity, the terminal portion of the oviduct being

furnished with retrorse hairs which help to hold it in place during the act.

The paper concludes with some studies of the internal anatomy of Pronuba and Prodoxus.

THE HIBERNATION OF ALETIA XYLINA (SAY), IN THE UNITED STATES A SETTLED FACT. By C. V. RILEY, of Washington, D. C.

[ABSTRACT.]

I HAVE already shown in previous remarks before the Association that there were various theories held by competent men — both entomologists and planters — as to the hibernation of this Aletia (the common cotton worm of the south); some believing that it hibernated in the chrysalis state, some that it survived in the moth state, while still others contended that it did not hibernate at all in the United States. I have always contended that the moth survived within the limits of the United States, and in this paper the fact of its hibernation, principally under the shelter of rank wire-grass, is established from observations and experiments made during the past winter and spring. The moth has been taken at Archer, Fla., during every winter month until the early part of March when it began to disappear, but not until eggs were found deposited. The first brood of worms was found of all sizes during the latter part of the same month on rattoon cotton, while chrysalides and fresh moths were obtained during the early part of April.

The fact thus established has this important practical bearing:

Whereas, upon the theory of annual invasion from some exotic country there was no incentive to winter or spring work looking to the destruction of the moth, there is now every incentive to such action as will destroy it either by attracting it during mild winter weather by sweets, or by burning the grasses in which it shelters. It should also be a warning to cotton growers to abandon the slovenly method of cultivation which leaves the old cotton stalks standing either until the next crop is planted or long after that event, for many planters have the habit of planting the seed in a furrow between the old rows of stalks. The most careful recent researches all tend to confirm the belief that Gossypium is the only

plant upon which the worm feeds within the cotton belt; so that in the light of the facts presented there is all the greater incentive to that mode of culture which will prevent the growth of rattoon cotton, since it is questionable whether the moth would survive long enough to perpetuate itself upon newly sown cotton except for the intervention of the rattoon cotton.

Emulsions of Petroleum and their value as Insecticides. By C. V. Riley, of Washington, D. C.

[ABSTRACT.]

The value of petroleum for the destruction of insects has long been recognized and I have for years been endeavoring to solve the question of its safe and ready use for this purpose without injury to plants. The paper contains the results of extended experiments carried on under my direction, by several of my assistants and particularly by Prof. W. S. Barnard, Mr. Jos. Voyle of Gainesville, Fla., Mr. Clifford Richardson, assistant chemist of the Department of Agriculture, and Mr. H. G. Hubbard, who has for over a year been devoting his time to practical tests in orange groves at Crescent City, Fla.

Passing over the ordinary methods of oil emulsions by phosphates, lactophosphates and hypophosphites of lime and various mucilaginous substances, experience shows that, for the ordinary practical purposes of the farmer and fruit-grower, soap and milk are among the most available substances for the production of petroleum emulsions.

Ordinary bar soap scraped and rubbed into paste at the rate of 20 parts soap, 10 parts water, 30 parts kerosene and 1 part of fir balsam, will make, when diluted with water, an emulsion stable enough for all practical purposes, as the slight cream which in time rises to the surface, or the flakiness that often follows is easily dissipated by a little shaking. Soap emulsions are, however, less satisfactory and efficient than those made with milk. Emulsions with milk may be made of varying strength, but one of the most satisfactory proportions is 2 parts of refined kerosene to 1 part of sour milk. This must be thoroughly churned (not

merely shaken) until a butter is formed which is thoroughly stable and will keep indefinitely in closed vessels and may be diluted *ad libitum* with water when needed for use. The time required to bring the butter varies with the temperature and both soap and milk emulsions are facilitated by heating the ingredients. Ordinary condensed milk may also be used by thoroughly stirring and beating it in an equal or varying quantity of kerosene.

The diluted emulsion when prepared for use should be finely sprayed upon the insects to be killed, its strength varying for different insects or plants and its effect enhanced when brought forcibly in contact with the insects.

Of mucilaginous substances, that obtained from the root of *Zamia integrifolia*, a plant quite common in parts of Florida, and from the stems of which the Florida arrowroot is obtained, has proved useful as an emulsifier.

These petroleum emulsions have been used with success by Dr. J. C. Neal, of Archer, Fla., against the Cotton Worm, without injury to the plant, but their chief value depends on their efficacy against the different scale-insects which affect Citrus plants. Experience so far shows that such plants do not suffer from its judicious use, but that it must be applied with much more care to most deciduous fruit trees in order not to injure them.

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